DECREASING THE LENGTH OF STAY AFTER MYOCARDIAL INFARCTION

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One of the topical issues of the national cardiology is the problem of rehabilitation of patients who survived myocardial infarction with the goal to restore working ability, including physical, psychological and social rehabilitation of this group of patients. On the other hand, under the present conditions with scarce financing of health care shortening of the length of stay is of great economic importance.

Methodical recommendations for rehabilitation of patients with myocardial infarction which were developed in the 70's envisage rehabilitation by stages with the average length of stay at a hospital being 30 days from the onset of acute myocardial infarction (*L.F. Nikolayeva, 1988*).

Shortening of the length of stay by means of early mobilization of patients is widely used in different clinics abroad (M.H. Rowe, 1989, J. Alpert, 1993) and does not lead to an increase in the number of complication. Several Russian authors showed that a shorter length of stay has a number of advantages of economic, physical, psychological, professional and social character for this category of patients (*M.I. Izvekova, 1988; I.Y. Yupatov, 1993; N.I. Tarasov, 1995)*. In spite of it, the possibility of early mobilization of patients at the inpatient stage is only being considered at separate clinics including those in Novosibirsk (*A.D. Kouimov, 1992*), but as yet the expertise of foreign colleagues has not been introduced into national cardiology practice.

It is well known that among people suffering from myocardial infarction a group of patients can be outlined which is characterized by a favorable course of the disease, and the risk of death within the first month from the onset of infarction for this group does not exceed 1 – 2%. This category of patients can be rehabilitated under an early rehabilitation program.

However, at the present time there are no clear-cut individualized programs for early rehabilitation of patients with myocardial infarction with estimation of the efficiency of the programs and outcome prognosis. There are no criteria for early assigning of patients to groups with lower or higher risk of complications and hence requiring either shortcut rehabilitation or traditional time for rehabilitation with possible cardiosurgical treatment.

In order to evaluate the existing practice 100 case records were analyzed of patients with acute myocardial infarction who were treated in specialized infarction units in February – April of 1996 (Urgent Care Hospital No. 1 – 40 patients, Urgent Care Hospital No. 2 – 30 patients and– 30 patients).

The distribution of patients depending on the outcome was as follows:

	discharged patients	died	mortality, %
Urgent Care Hospital No. 1 –	35	5	12.5
Urgent Care Hospital No. 2	27	3	10.0
Clinical Hospital No. 1	26	4	13.3
Average mortality			12.5%

Time from onset of symptoms to admission :

	UC Hospital # 1	UC Hospital # 2	C Hospital # 1
1 – 6 hours	16 patients (40%)	13 patients (43.3%)	20 patients (66.6%)
24 hours	9 patients (22.5%)	17 patients (23.3%)	4 patients (13.3%)
2 -- 3 days	15 patients (37.5%)	4 patients (13.3%)	4 patients (13.3%)
More than 3 days	–	6 patients (20.1%)	2 patients (6.8%)

Thus, only 40 – 66% of patients (49% on the average) were admitted to a hospital within the first 6 hours from the onset of the disease, and only 22% of patients with acute myocardial infarction were admitted within 2 hours.

Causes of late hospitalization:

Discharged patients	**UC Hospital # 1**	**UC Hospital # 2**	**C Hospital # 1**
Mistakes of urgent care teams	3 (12.5%)	2 (11.7%)	1 (10.0%)
Mistakes of outpatient clinics	2 (8.3%)	1 (5.8%)	1 (10.0%)
Mistakes of inpatient clinics	1 (4.2%)	1 (5.8%)	– (0.0%)
Late call for help	17 (70.8%)	12 (70.5%)	6 (60.0%)
Refusal from hospitalization	–	–	–
Diagnostic problems	1 (4.2%)	1 (5.8%)	2 (20.0%)
Patients who died			
Mistakes of urgent care teams	–	1 (33.3%)	–
Mistakes of outpatient clinics	1 (20.0%)	–	–
Mistakes of inpatient clinics	–	–	–
Late call for help	2 (40.0%)	2 (66.7%)	3 (75.0%)
Refusal from hospitalization	1 (20.0%)	–	1 (25.0%)
Diagnostic problems	1 (20.0%)	–	–

The degree of myocardial lesion:

Small focus myocardium infarction 48%

Large focus myocardium infarction 43%

Transmural myocardial infarction 18%

Mortality depending on the degree of lesion:

Small focus myocardial infarction	1	(20.0%)
Large focus myocardial infarction	7	(20.0%)
Transmural myocardial infarction	5	(27.7%)

The age of 39% of patients was under 60. Mortality in this group was 2.56% (1 patient).

Cause of death:

Cardiogenic shock	4	(33.3%)
Thromboembolism of pulmonary artery	2	(16.8%)
Chronic insufficiency of circulation	3	(25.0%)
Cerebral coma	1	(8.3%)
Ventricular fibrillation	1	(8.3%)
Acute incompetence of left ventricle	1	(8.3%)

Time of death:

Under 1 hour	2	(50.0%)
< 6 hours	1	(25.0%)
< 24 hours	1	(25.0%)
Mortality within 24 hours was 33.3%.		
< 3 days	4	(50.0%)
< 10 days	3	(37.5%)
To 30 days	1	(12.5%)

First address for medical help:

To outpatient clinics	18%
To emergency medical service	78%
To hospital reception wards	4%

After the patients called for medical help, 72 patients were hospitalized by a cardiological team, 4 patients by a resuscitation team, and 2 patients by on-line teams (these cases were included in the column «mistakes of urgent care». Ambulance with urgent care teams arrived in 15 to 40 minutes. The average time spent by a team with the patient was 20 – 50 minutes.

On pre-admission stage all patients with pain syndrome were given narcotic analgesics (phentanyl with droperedol or omnopon, promedol), nitroglycerin for the second time. In 18 cases nitroglycerin spray was used.

Of 100 patients 94 were admitted straight to intensive care units and resuscitation, bypassing reception wards. The average length of stay in an intensive care unit was 4.3 days. 6 patients were hospitalized at late stages of the disease directly in infarction units (over 3 days from the onset of infarction).

EKG was performed at the first stage of urgent care in all patients. Antiarrhythmic therapy was carried out only in case of a heart rhythm disturbance.

Systemic thrombolysis was done to 42 patients upon the admission with the help of activator of plasminogen *Aktelize* of *Boehringer Ingelheim Farma GmbH*. The preparation was introduced on a 3-hour schedule during the following period of the disease development:

to 1 hour	2 patients	4.6%
to 2 hours	11	26.2%
to 3 hours	14	33.3%
to 6 hours	10	23.8%
to 24 hours	3	7.1% (late hospitalization)

Cessation of pain immediately after introduction of *aktelize* was recorded in 18 cases (42.8%), after 24 hours in 9 cases (21.4%) and after 3 days in 4 cases (9.5%). Recurrent pain on the 7th day appeared in 3 patients (7.1%). Simultaneously with systemic thrombolysis all patients received standard basic therapy which included narcotic drugs, nitrates, heparin, disaggregants, and in some cases beta-blockers.

Complications during the acute phase of myocardial infarction prior to the beginning of systemic thrombolysis were observed in 23 of 42 patients:

Pulmonary embolism	2.4%
Pulmonary edema	4.8%
Cardiogenic shock	7.1%
Disturbance of rhythm and conductivity	28.5%
Insufficiency of circulation of grade II	4.8%
Pericarditis	2.4%

The above variations were arrested in 11 cases (47.8%) during the first 24 hours.

Thus, the results of the analysis show that only 40 – 66% of patients with myocardial infarction are hospitalized within 6 hours from the outbreak of the disease. 94% of patients passed through the intensive care and resuscitation unit with the average length of stay 4.3 days in the unit. Mortality in the result of acute myocardial infarction was 12.0%, 33.3% of deaths occurred in the first 24 hours. Mortality in the group of patients under 60 (39.0%) was 2.56%. the average length of treatment at the hospitals was from 24 to 32 days on the basis of traditional therapy. The use of systemic thrombolysis reduces the length of stay to 21 – 24 days with the normal schedule of physical rehabilitation.

The main trends for solving the problem of the excessive length of stay at inpatient clinics are as follows:

- early hospitalization in intensive care units of specialized hospitals
- use of systemic thrombolysis
- development of criteria for selecting patients suited for early rehabilitation
- change of the system of physical rehabilitation on the inpatient stage

- development of a system of patient monitoring in the process of early activation.

Preliminary program for the reduction of the length of stay of patients with myocardial infarction at the inpatient clinic

The maximum risk of development of serious complications in patients with acute myocardial infarction falls on the first hours and days from the onset of the disease. In the sub-acute phase the risk of complications is considerably lower. Therefore, the length of stay should be defined according to the least possible risk of complications and death. A higher risk and an increased length of stay are observed in the presence of the main complications of the disease: insufficiency of circulation, extension of infarction, recurrence of ischemia, disturbances of heart rhythm and conductivity, post-infarction angina as well as the age of patients. Among all patients with myocardial infarction a group of persons can be outlined which is characterized by a favorable course of the disease. They have a rather low risk of complications after the first days of the disease and they can be mobilized at early stages under the program of early rehabilitation.

Selection criteria for candidates to be included in the group of early rehabilitation

1. The diagnosis of myocardial infarction must be based on the criteria of the World Health Organization (1970) which include the typical clinical picture of the disease, distinctive changes in ECG and dynamics in the activity of blood enzymes.

2. A group of patients fit for early mobilization should include people at the age of 30 to 60 with small or large focus (including transmural) myocardial infarction who were admitted in the intensive therapy unit during the initial 24 - 36 hours after the onset of symptoms.

3. The question concerning the participation in the individual program of early rehabilitation should be considered during the first 2 or 3 days after the condition of the patient is stabilized and he/she leaves the intensive care ward. Consent of the patient must be received.

4. Contraindications for including the patient in the group of early rehabilitation:
   - patients with cardiogenic shock, extension of infarction, acute aneurysm of the left ventricle, early post-infarction unstable angina, previous myocardial infarction in the history (transmural or with decreased function of the left ventricle);
   - patients with complicated disturbances of the heart rhythm and conductivity, including *Lown-Wolf* extrasystoles > class 1, paroxysmal supraventricular and atrial tachyarrhythmia, non-paroxysmal atrial fibrillation, WPW syndrome, atrioventricular blocks of 2nd and 3rd degree with anterior localization and any inferior localization of myocardial infarction and intraatrial blocks;
   - with disturbances of circulation > class 1 after *Killip* (including that which preceded the disease), systolic pressure under 120 mm Hg, heart rate greater than 100 per minute, ejection fraction under 40% during echocardiography and increased dimensions of the heart;
   - with mural thrombus and/or thromboembolic complications due to lesions of peripheral vessels;
   - with hypertension of 2nd or 3rd degree and constant blood pressure 160/100 mm Hg in patients who are being treated;
   - with concurrent pathology which requires medication.

5. Methods necessary for estimation of criteria for including or excluding of patients in the program of early rehabilitation:
   - X-ray of chest during the first 24 - 48 hours to reveal signs of cardiac decompensation;
   - ECG monitoring during the first 24 - 48 hours in the intensive care unit;
   - registration of ECG in 12 common leads every day until the formation of sub-acute period of myocardial infarction (Q wave appearance), then once in 3 – 5 days and 1 day prior to discharge;
   - activity of blood serum enzymes (AcA, AlAT, KFK, LDG);
   - echocardiography in two dimensions on the 8th - 12th day (prior to load tests) in order to evaluate the state of the myocardium and to rule out complications;
   - early stress tests (bicycle ergometry or

) on the 12th – 14th day after coronary active drugs are discontinued 24 prior to the testing. Criteria for discontinuation of the stress test should correspond to common requirements but not to exceed the heart rate over 120 per minute;

- Holter monitoring during 24 hours to rule out painless ischemia, heart rate disturbance and conductivity.

6. Draft program for physical rehabilitation during 14 – 16 days:

Small focus myocardial infarction

Days 1 & 2 Turning, movement of extremities, meals and washing while sitting in the bed.

Day 3 Ditto + sitting in the bed with dangling feet, bedside commode.

Days 4 - 5 Ditto + walking in the room, meals at a table.

Day 6 Ditto + walking in the corridor ~ 50 m three/four times a day, common lavatory.

Days 7 - 8 Ditto + walking in the corridor ad lib, climbing a stairway 1 floor up.

Days 9 -10 Ditto + walking outside ~ 500 m at the rate of 80 steps per minute, climbing t floor plus 1 span of the stairway.

Days 11-12 Ditto + walking outside at the rate of 100 steps per minute at the distance of 1,000 – 1,500 meters, climbing the 2nd floor.

Days 13-14 Ditto + walking outside at the rate of 100 - 110 steps per minute at the distance of 2,000 meters (in two series) , climbing 2 floors.

Large focus myocardial infarction

Days 1 - 3 Turning, movement of extremities, meals and washing while sitting in the bed.

Days 4 - 5 Ditto + sitting in the bed with dangling feet, bedside commode.

Day 6 Ditto + walking in the room, meals at a table.

Days 7 - 8 Ditto + walking in the corridor ~ 50 m three/four times a day, use of common lavatory.

Days 9 -10 Ditto + walking in the corridor ad lib, climbing a stairway, 1 floor up.

Days 11-12 Ditto + walking outside ~ 500 m at the rate of 80 steps per minute, climbing t floor plus 1 span of the stairway.

Days 13-14 Ditto + walking outside at the rate of 100 steps per minute at the distance of 2,000 meters (in two series) , climbing 2 floors.

7. Discharge criteria at the unit for after-treatment of patients with myocardial infarction at the *Rechkounovski* sanitarium:

- coping with the program of physical rehabilitation without complications or attacks of unstable angina;
- stabilization of henodynamic indices, normalization of the level of blood enzymes, regular ECG dynamics.

- the results of Holter ECG monitoring show the absence of critical rhythm disturbances and conductivity (small focus ventricular extrasystolism is allowed < class 1 of *Lown-Wolf*) and ischemia episodes;
- satisfactory results of an early stress test: load on the bicycle ergometer is not less than 50 Wt without clinical and/or electrocardiographic signs of myocardial ischemia, critical heart rate during

-test is > 100 per minute;

- presence of unsatisfactory results of early load tests is not the indication for undertaking coronography.

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